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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/656,091

09/05/2003

Thomas L. Beck

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10/14/2005

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EXAMINER

NGHIEM, MICHAEL P

ART UNIT

PAPER NUMBER

2863

DATE MAILED: 10/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/656,091

Applicant(s)

BECK ET AL.

Examiner

Michael P. Nghiem

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 July 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-118 is/are pending in the application.
- 4a) Of the above claim(s) 1-20 and 88 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 77-87, 95-106 and 109-118 is/are allowed.
- 6) ☒ Claim(s) 21, 22, 24-26, 28, 30-32, 34-37, 39, 41-43, 50-52, 59-61, 68-70, 89 and 107 is/are rejected.
- 7) ☒ Claim(s) 23, 27, 29, 33, 38, 40, 44-49, 53-58, 62-67, 71-76, 90-94 and 108 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 7-8-05
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

Election/Restrictions

Applicant's election without traverse of Group II, claims 21-87 and 89-118 in the reply filed on July 20, 2005 is acknowledged.

Claims 1-20 and 88 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected inventions of Group I and III, there being no allowable generic or linking claim.

Specification

The disclosure is objected to because of the following informalities:

Application Serial Numbers (page 1, lines 12 and 14) are missing.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 21, 22, 24-26, 28, 59-61, 68-70, and 107 are rejected under 35 U.S.C. 102(b) as being anticipated by Bartley et al. (US 4,108,574).

Regarding claims 21, 59, 77, and 107, Bartley et al. discloses a method (Fig. 1) of controlling a centrifugal pump (16) for transferring fluid within a fluid system (Fig. 1), the method comprising the steps of:

- determining a value of speed input to the centrifugal pump (value of speed is deemed to be determined by varying the speed of the centrifugal pump, Abstract, lines 3-4);
- determining a value of pump flow rate (measuring instantaneous flow rate, Abstract, lines 1-2);
- using the value of speed input and the value of pump flow rate to calculate one or more values representing the performance of the centrifugal pump (calculating pump pressure rise from flow rate and pump speed, column 5, line 27 – column 6, line 11);
- using the centrifugal pump performance values to produce one or more command signals (column 6, lines 32-36);
- using the command signals to control the speed of the centrifugal pump (column 6, lines 36-37),

wherein the values of speed input and pump flow rate are determined using measured or calculated values without requiring down hole sensors (no down hole sensors disclosed in Bartley et al.).

Regarding claims 22, 26, 60, and 69, Bartley et al. discloses:

- selecting a centrifugal pump performance parameter to control (flow rate, column 6, lines 25-37);
- determining a setpoint for the selected centrifugal pump performance parameter (reference signal for desired flow rate, column 6, lines 32-34);
- calculating a control signal using the setpoint value of the selected centrifugal pump performance parameter (difference between desired flow rate signal and flow rate signal, column 6, lines 33-36);
- calculating the command signals from the control signal (column 6, lines 36-37).

Regarding claims 24 and 28, Bartley et al. discloses that the selected centrifugal pump performance parameter is the pump head pressure (column 6, lines 47-49).

Regarding claims 25 and 68, Bartley et al. discloses:

- measuring values of electrical voltages applied to the motor (column 3, lines 4-6) and currents drawn by the motor (column 3, lines 41-44);
- using the measured values of electrical voltages applied to the motor and currents drawn by the motor to calculate a value for the motor speed (column 3, lines 4-6, 41-44).

Regarding claims 61 and 70, Bartley et al. discloses that the selected fluid system performance parameter to control is the pump suction pressure (column 6, lines 47-49).

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 30-32, 34-37, 39, 41-43, 50-52, and 89 are rejected under 35 U.S.C. 102(e) as being anticipated by Horo et al. (US 6,592,340).

Regarding claims 30, 41, and 89, Horo et al. discloses a method (Fig. 1c) of controlling a centrifugal pump (10) for transferring fluid within a fluid system (Fig. 1c), the method comprising the steps of:

- determining a value of speed input to the centrifugal pump (column 7, lines 6-7);
- determining a value of torque input to the centrifugal pump (column 7, line 6);
- using the value of speed input and the value of torque input to calculate one or more values representing the performance of the centrifugal pump (column 5, lines 15-23);
- using the centrifugal pump performance values to produce one or more command signals (command signal from control system, Abstract, line 1, for adjusting rotation speed, Abstract, line 3);
- using the command signals to control the speed of the centrifugal pump (Abstract, lines 1-13), wherein the values of speed input and torque input are determined using

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measured or calculated values without requiring down hole sensors (no down hole sensors disclosed in Horo et al.).

Regarding claims 31, 36, 42, and 51, Horo et al. discloses:

- selecting a centrifugal pump performance parameter to control (rotation speed of pump, Abstract, line 3);
- determining a setpoint for the selected centrifugal pump performance parameter (operating point, Abstract, lines 4-7);
- calculating a control signal using the setpoint value of the selected centrifugal pump performance parameter (signal to change rotational speed, Abstract, line 11);
- calculating the command signals from the control signal (Abstract, lines 9-12).

Regarding claims 32 and 37, Horo et al. discloses that the selected centrifugal pump performance parameter is the pump flow rate (column 6, lines 56-59).

Regarding claims 34 and 39, Horo et al. discloses that the selected centrifugal pump performance parameter is the pump head pressure (column 6, lines 60-61).

Regarding claims 35 and 50, Horo et al. discloses measuring values of electrical voltages applied to the motor and currents drawn by the motor, and using the measured values of electrical voltages applied to the motor and currents drawn by the motor to calculate a value for at least one of the parameters selected from the group consisting

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of motor torque and the motor speed (torque is power input, column 5, line 20, can be inherently calculated using voltage and current).

Regarding claims 43 and 52, Horo et al. discloses that the selected fluid system performance parameter to control is the pump suction pressure (column 6, lines 60-61).

Regarding claim 89, Horo et al. further discloses a plurality of sensors (EI(S), EI(X)) located at or above ground level (Fig. 1c).

Allowable Subject Matter

Claims 23, 27, 29, 33, 38, 40, 44-49, 53-58, 62-67, 71-76, 90-94, and 108 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 77-87, 95-106, and 109-118 are allowed.

Reasons For Allowance

The **combination** as claimed wherein the selected centrifugal pump performance parameter is the pump flow rate and the step of using the command signals to control the speed of the centrifugal pump includes repetitively switching the

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speed of the centrifugal pump between a set pump speed for a portion of a cycle period and zero speed for the remainder of the cycle period to achieve an average pump flow rate equal to the setpoint value of the pump flow rate (claims 23, 27, 33, 38, 94) or the values representing the performance of the pump comprise values representing pump mechanical input power limit and pump mechanical input power, and the step of using the command signals to control the speed of the centrifugal pump comprises the steps of: comparing the pump mechanical input power limit and pump mechanical input power; and reducing the speed of the centrifugal pump if the value of pump mechanical input power is greater than the pump mechanical input power limit (claims 29, 40) or deriving the setpoint value for pump suction pressure from a fluid level command (claims 44, 53, 62, 71) or operating the centrifugal pump at a set speed until the pump suction pressure decreases to a value less than or equal to a pump suction pressure lower limit, said pump suction pressure lower limit equal to the pump suction pressure setpoint minus a tolerance; and operating the centrifugal pump at zero speed until the pump suction pressure increases to a value greater than or equal to a pump suction pressure upper limit, said pump suction pressure upper limit equal to the pump suction pressure setpoint plus a tolerance (claims 49, 58, 67, 76) or measuring values of electrical voltages applied to the first and second motors and currents drawn by the first and second motors; and using the measured values of electrical voltages applied to the first and second motors and currents drawn by the first and second motors to calculate for the first and second centrifugal pumps values for at least one of the parameters selected from the group consisting of motor torque

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and motor speed (claims 78, 108) or determining values of torque input to each of the centrifugal pumps; and using the values of torque inputs and speed inputs to the first and second motors and currents drawn by the first and second motors to calculate for the first and second centrifugal pumps values for pump flow rate (claim 79) or determining values representing the performance of the fluid system; using the pump performance values and fluid system performance values to calculate a feedforward signal by predicting a value of mechanical input to the centrifugal pump when operating with the selected centrifugal pump performance value at the setpoint value (claims 80, 93, 95, 100, 109, 114) or using the centrifugal pump performance values to produce command signals includes means for calculating a feedback signal indicative of the difference between a current value of a selected centrifugal pump performance parameter and a setpoint value of the selected centrifugal pump performance parameter, and means for calculating the command signals from the feedback signal (claim 90) is not disclosed, suggested, or made obvious by the prior art of record.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Nghiem whose telephone number is (571) 272-2277. The examiner can normally be reached on M-H.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Barlow can be reached on (571) 272-2269. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



MICHAEL NGHIEM
PRIMARY EXAMINER

Michael Nghiem

October 11, 2005